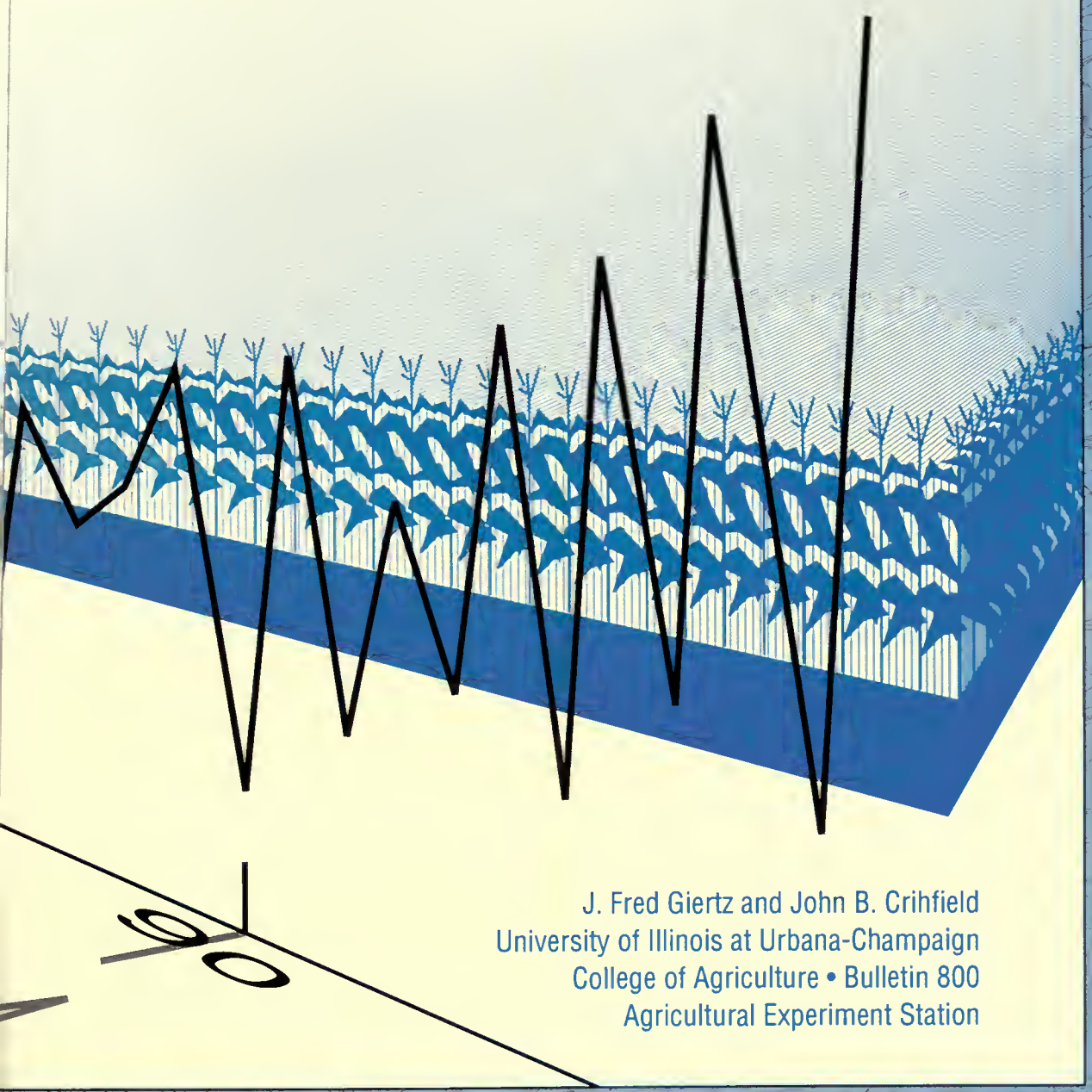
Impact of Business Climate Factors on Value-Added Activities in Illinois Agriculture

A First Analysis



J. Fred Giertz and John B. Crihfield
University of Illinois at Urbana-Champaign
College of Agriculture • Bulletin 800
Agricultural Experiment Station

AUTHORS: J. Fred Giertz is a professor of economics at the Institute of Government and Public Affairs, and John B. Crihfield is an assistant professor of agricultural economics, Department of Agricultural Economics, University of Illinois at Urbana-Champaign.

Editor: Nancy Nichols

Designers: Krista Sunderland and Brian Broderick

Office of Agricultural Communications and Education, University of Illinois at Urbana-Champaign

Contents

Tables

Introduction

Adding value to Illinois agricultural products is an economic development strategy intended to benefit both the agricultural sector and the manufacturing and industrial sectors of the state's economy. Both areas are now experiencing problems and could benefit from an economic stimulus. Implementing a value-added strategy also has the potential to create jobs in rural areas of the state for workers forced to make the transition from farming to other kinds of activities.

This study characterizes and analyzes the agricultural value-added strategy for Illinois. First, the term *value-added* is carefully defined. It is important to have an operationally meaningful definition that can be applied in an empirical analysis. Next, the potential impacts of such a policy and details about its strengths and weaknesses are discussed. The value-added strategy is compared to related development strategies. The role of government (especially the state) in implementing agricultural value-added strategies is also addressed. Finally, a framework is provided for evaluating the success of particular projects.

An assessment of the overall business climate in Illinois aids in evaluating regional business climates and their potential for various value-added activities. Special attention is directed toward the impact of the business environment on existing value-added activities that may serve as a guide for potential new endeavors. *Business climate* refers to a variety of factors affecting the cost of doing business in a certain location. This includes such things as labor costs (direct wages, unemployment insurance, and workers' compensation), state and local tax burdens, availability of financial services, utility costs, and transportation costs. The business environment is affected by not only these cost factors but also the range of services offered to businesses and their employees by state and local governments.

It is important to identify value-added activities in which Illinois can favorably compete with other states. Effective promotion of these activities depends on this knowledge. It is also vital to know which regions in the state are best suited for these kinds of activities. Furthermore, if unfavorable conditions are identified, efforts can be directed to making changes to enhance Illinois's competitiveness.

The empirical work in the second part of this paper develops a model that can aid in identifying overperforming and underperforming value-added sectors. Extending this work might result in suggestions for policy changes to remove existing barriers to the development of new value-added enterprises and to encourage existing firms to relocate to or expand in Illinois.

The Agricultural Value-Added Approach

Value-Added Defined. The idea of a "value-added" strategy for promoting agriculture or agriculture-related activities has received a great deal of attention in recent years. In an era when economic development has become a prime goal of state and local governments, this approach has often been cited as a means of dealing with crucial problems of rural economic development. Unfortunately, the approach has not always been carefully defined. Often, it is simply a general heading for a diverse set of possible activities, as opposed to a coherent strategy for economic advancement.

The term *value-added* comes from national income accounting and refers to a procedure for measuring national output, such as gross national product (GNP). To avoid double counting in the measurement of national income, only the value-added of each firm is counted, rather than the total value of the firm's output. In accounting, a firm's value-added is the difference between the revenue the firm generates from selling its output and the value of the firm's purchases from other firms. Viewed constructively, a firm's value-added is its wages and profits.

This definition is useful but not very precise in delineating what a value-added agricultural strategy might be. It is simply a way of measuring economic activity, not a strategy for promoting development. Applied to agriculture, the definition is wide-ranging; it includes all activities using agricultural inputs, from farming through processing to the final sale of goods. This broad definition covers such a wide variety of activities that it does not help to establish a clear approach to development.

Used informally, a value-added activity has been defined to include any process using agricultural inputs that is at least one step removed from the basic agricultural commodity. But this definition fails to capture an important aspect of the value-added strategy — that the agricultural product to which the value is added is locally created. A more general definition includes *any activity that increases the value (by whatever means) of any raw material indigenous to the local area.*[1] This broader definition includes not only traditional activities, such as processing, but also marketing and distribution. The term *raw material* applies not only to agricultural products but also to mineral products and products from forests, lakes, streams, and oceans.

Using this definition, *value-added activity* has broad applicability and applies to many industries only tangentially related to agriculture. For the purposes of this study, however, the focus will be on value-added activities that are new (at least in the local area) or innovative and that involve a substantial agricultural component in the value of the product.

Successful new value-added activities can be expected to have complementary impacts on the local economy. They should increase the demand for local agricultural products; increase local incomes in related sectors involving processing, manufacturing, transportation; or both.

The increase in demand for local products could arise in several ways. For example, local agricultural inputs could be substituted for ones produced in other regions or countries. This might involve replacing agricultural imports with local products. Or it might involve expanding exports of Illinois agricultural products to other states and countries. In addition, local agricultural commodities might replace nonagricultural inputs used to make various products. The processing of agricultural inputs is what usually comes to mind when value-added activities are discussed. However, value can be imparted to agricultural commodities in ways other than processing — through better transportation and storage arrangements, for instance, or by the dissemination of information concerning the uses, quality, and availability of Illinois products.

Incomes in related sectors could be increased by the development of new or expanded local manufacturing and processing activities that make use of local agricultural products. Similar increases might occur in transportation, storage, marketing, and financial activities related to agricultural products. This would have an impact over and above the direct effect of increasing agricultural demand. As noted, value-added activities need not be innovative and highly technical, yet these are the kinds of activities on which the greatest attention is often focused.

A list of both actual and proposed value-added activities for Illinois is useful:

- Ethanol for automobile fuel
- Corn-based sweetener to replace sugar
- Corn-based road deicer
- Corn-based biodegradable plastic bags
- Soybean-based printing ink
- Development of soybeans that can be fed to animals without processing
- Substitution of locally grown hay for hay from other states
- Expansion of livestock and poultry production (for example, cattle, turkeys, and chickens) to make use of Illinois grain
- Improved grading and handling standards for commodities to promote export penetration

The policies and techniques for developing and promoting these value-added products and activities are discussed below.

Value-Added Strategies. The idea of a value-added strategy in agriculture suggests the need to promote such activities to provide encouragement beyond that given by basic market forces. If these activities developed spontaneously without the help of government, there would be no need to discuss a development strategy. The presumption is that the state and, possibly, its universities can promote value-added activities that would not otherwise have materialized and that will ultimately benefit the state. This promotion can be accomplished in several ways: (1) through research to devise and perfect potentially beneficial value-added products and activities, (2) by direct subsidies to firms to encourage such activities, and (3) by the removal of existing impediments that hinder these activities.

This differs from (but is not necessarily in conflict with) traditional government programs that promote increased productivity and efficiency in primary agricultural activities. In some ways, the value-added strategy expands on the traditional functions of the state and its universities. Those functions have been to provide marketing assistance to producers and promote agricultural research to develop new products or to better use agricultural inputs in existing products. It may also entail more aggressive economic development promotion similar to that which state governments have used in recent years. These techniques involve a wide range of targeted subsidies, including tax abatements, financial aids (both lending and equity), special services such as employee training, and infrastructure improvements such as building and repairing roads and sewers.

These value-added strategies have some similarities with two approaches used in developing countries: import substitution and export promotion. Import substitution attempts to encourage domestic firms to produce goods previously imported and to use domestic inputs whenever possible. On a national level, this policy is often pursued through tariffs and quotas. Because these protectionist policies are not available for states, an alternative is to subsidize selected domestic inputs and final goods. This overtly interventionist strategy requires the government to select particular firms or products to support.

Export promotion, on the other hand, is designed to encourage conditions that allow for low-cost production and to promote open trade, without the barriers used in import substitution. Direct subsidization of exports is an option. However, export promotion usually depends on government provision of an efficient infrastructure conducive to making firms competitive in the world economy without explicitly targeting particular activities. Human capital is strengthened through an educational system, and nonhuman capital, such as transportation and communications systems, is also enhanced. Prices in world markets determine the country's areas of specialization.

Generally, import substitution involves the use of targeted initiatives, while export promotion relies more on market forces. Internationally, import substitution strategies sometimes have been found to generate short-term successes, but few long-term gains. In fact, this approach is now in considerable disrepute as a development strategy.

Export promotion, a more long-term approach, is less certain of specific outcomes. Some countries pursuing export promotion during the last four decades (such as Japan and, more recently, Taiwan, Singapore, and South Korea) have performed much better than those focusing on import substitution. These countries, however, may have had an inherent advantage, such as a relatively skilled work force, that contributed to the success of the strategy. Such a strategy would probably have worked less well in countries without these advantages. For example, developing countries that have concentrated on heavy industries such as iron and steel have generally met with little success. If there is a

lesson to be learned from the international experience, it is to be wary of targeted programs that rely on heavy subsidies to encourage particular firms or products.

Potential Strengths. Before discussing particular strategies, it is important to conceptualize the potential strengths and weaknesses of a value-added approach. The potential strengths are straightforward. One intention is to more fully use the available resources of the state. This involves bringing unemployed workers or unused agricultural or industrial capacity into production. It also may entail the use of currently employed resources in a more productive manner, thereby increasing state output. The goal is simple, and the results, if successful, can be extremely beneficial to the state. Such a policy simultaneously benefits both rural and urban citizens.

A successful value-added strategy concentrates on the inherent strengths (both agricultural and industrial) of the state's economy. The goal of such a policy must be to promote activities that can ultimately compete on their own in the world market. It attempts to promote activities in which the state has an existing or potential comparative advantage. This might be done through infrastructure development (such as transportation and communications improvements), research promotion, and information dissemination. The removal of burdensome restrictions and inappropriate tax policies is also important.

The key to the success of a value-added approach is to exploit existing strengths of a state's economy rather than attempt to create strengths. This is particularly important in today's interdependent world economy. Any policy that attempts to work against the forces of the world market is doomed to fail.

Potential Weaknesses. Unfortunately, the implications of value-added strategies are not always clear and direct. Before adopting such strategies, one must look at potential negative factors that might arise. Note that this detailed discussion of potential problems with value-added strategies in no way suggests that they are inappropriate. However, it is important to understand both the benefits and the costs of such an approach to ensure its useful application.

A fundamental weakness of the value-added approach involves the ability and political will of governments to choose policies that target resources to activities with the likelihood of long-term success. It must be remembered that the market is a powerful and generally efficient institution for allocating resources. The following questions must be addressed. If important potential value-added activities are available in a state, why have they not been, or why will they not be, exploited by private firms seeking profit? In what way is the government equipped better than private firms to determine comparative advantage? Critics might argue that in many circumstances the private sector will implement a value-added approach when appropriate, without government guidance.

In response to these questions, a case can be made on efficiency grounds for the usefulness of government intervention. First, in the area of research, private firms, especially smaller ones, may not be able to conduct certain types of research leading to value-added innovations. That the knowledge resulting from research often has a high cost of creation but a low cost of dissemination argues in favor of public involvement. Similarly, general infrastructure improvements by the government also contribute to economic development.

The case for targeted aid for particular firms, products, or processes is not as clear-cut. Targeted subsidies or tax abatements might be justified on the grounds of providing either temporary developmental assistance to allow new activities to gain a foothold in the market or a remedy for artificial impediments that prevent firms from expanding into areas where a natural comparative advantage exists.

It is argued that temporary assistance is needed to allow firms venturing into new areas to

achieve an efficient scale of operations to compete effectively with established firms in other regions. This is much like the "infant industry" argument used to justify temporary protection from foreign competition for newly established industries. This potentially valid rationale is difficult to apply in the real world. The goal of such a policy is to provide initial assistance to firms that will ultimately succeed on their own but that are not able to convince private investors of their long-term viability. Assistance is not justified for firms that will succeed without assistance or ones that will likely fail even with short-term aid.

The problem facing government officials is to differentiate among these three categories of firms to target aid where it is likely to be most productive. This is often a daunting task. It is sometimes argued that private credit is unavailable to potentially viable firms because of imperfections in the capital markets. Somehow, it is argued, private financial institutions systematically underestimate the worthiness of firms to receive credit; this, in turn, retards development. It is asserted that governments are better able to judge the economic potential of firms than is the private market.

Such assertions are difficult to accept, however. To argue that systematic failures occur in ordinary investment decisions would seem to call into question the efficacy of the market system. No explanation is given as to how financial markets thought to be highly efficient in most other areas are in this case inferior to the policy making of state and local officials. A report by the Illinois Auditor General criticizing the state's development efforts in this area has recently created considerable controversy.[2]

As noted previously, even well-intentioned public officials are likely to have considerable difficulty determining where to target aid most effectively. Political considerations often impact these decisions, creating additional problems. Demands for assistance are likely to come from industries in distress, not necessarily from ones with the greatest development potential. The goal of a regional development strategy should be to promote activities where an emerging comparative advantage exists, not to prop up activities whose comparative advantage has been lost. An effective development strategy promotes rather than retards transition.

Subsidies dictated by political rather than efficiency concerns, or even by compassion for those in economic distress, are likely to be counterproductive. In the short run, the efficient targeting of development aid may not appear fair from a normative standpoint. For example, the most productive use of government resources may be for infrastructure improvements in areas that have high development potential rather than aid for declining industries or individuals who have been displaced by economic upheavals. To the extent that aid is given to firms or individuals in distress, it should be used to facilitate the transition to new activities, not to support existing ones. Politically, however, this policy is difficult to carry out.

An additional political problem is the government's difficulty in withdrawing aid from firms after a reasonable interval. Assistance for new activities can only be justified as a temporary measure during a start-up or transition period. Such aid establishes a natural constituency that supports continued, long-term assistance whether or not it is necessary. Even a successful firm and its employees are not likely to forgo aid voluntarily. Those affected will invariably lobby for support to be extended as long as possible. For unsuccessful firms, the aid may be a matter of survival, making it difficult for the state to remove the support system and let the firms die a natural death.

Although the general effectiveness of state-provided direct incentives for particular firms is controversial, some situations clearly require such aid. Existing regulatory (relating to zoning, utilities, or transportation) and tax policies may be unnecessarily burdensome to some firms. These artificial burdens may blunt the inherent competitive advantage for particular activities

and not allow these enterprises to develop. It is important for governments to reduce these impediments whenever possible to take advantage of a region's basic attributes. The best approach would be to eliminate these impediments by making general changes in the regulatory or tax environment. However, such general changes may be impossible for political reasons, necessitating targeted concessions to maintain competitiveness.

The provision of targeted preferences can be viewed as a piecemeal response to problems confronted by jurisdictions that attempt to use ability-to-pay taxes when the forces of competition penalize the use of anything other than benefits-based taxes. Assume that a local government is attempting to attract a new firm (or to retain an old one), yet the firm's expected profit level is less than it would be in some other location. If the government employed benefit taxation with local service provided at an efficient level, there would be little the government could or should do to attract (retain) the firm. However, if nonbenefit taxes were used and exceeded the marginal cost to the government of providing services for the firm, the government might find it advantageous to negotiate with the firm by granting special inducements. The result would be a kind of price (tax) discrimination based on relative elasticities of the firms involved. Presumably, highly mobile firms would be able to push their tax burden toward the benefit level.

The Effects of Incentives. In analyzing development policies such as the value-added strategy, a fundamental question arises concerning the impact of state and local policies on various economic decisions. Can such policies change the decisions of firms? If the answer is *no*, then these policies are doomed to fail. Contrary to the conventional wisdom among economists that tax differentials across locations are unimportant, recent econometric studies have shown that such tax and public-service differences do influence important economic variables. However, these effects are often subtle and far from precise in guiding the design of development policies. Most existing policies have been adopted with little or no research foundation. They are largely *ad hoc* in nature.

Most econometric studies have dealt with the effect of tax levels or changes in tax levels on aggregate employment or other measures of development. Recently, studies have dealt with more disaggregated, firm-level data. Still, these studies provide little guidance for evaluating the effects of such innovations as enterprise zones, loan guarantees, or equity participation.

It seems clear that targeted development assistance is potentially effective, at least from the narrow viewpoint of the local jurisdictions offering the subsidies. If overall general tax levels affect a firm's decisions, then so should targeted assistance, which is greater in magnitude. However, local governments are often unable to distinguish between firms that actually respond to these incentives and firms that simply use the location promise (or the departure threat) for strategic reasons to exact surpluses from these governments. There is a fundamental asymmetry in information involved in the bargaining process. Firms have access to information about the costs they impose and benefits they bestow on local jurisdictions. Governments, however, have considerably less information about the alternatives available to firms. This can lead to situations where firms appropriate much of the fiscal surplus they create. In summary, development policies can no longer be dismissed as ineffective from the viewpoint of local governments involved in the competition for development. But local governments have not applied them with precision. Clearly, research about these effects is necessary to guide an effective agricultural value-added strategy.

Tentative General Conclusions. Based on experience from both regional and national development policies, several general conclusions emerge. Development policies should create an environment in which individuals and firms can exploit a region's basic comparative ad-

vantage. Policies should rely on basic market forces and allow for as much flexibility as possible. Efficient programs in the following areas are generally desirable:

- Enhancing the physical infrastructure and promoting the development of human capital
- Promoting basic and applied research relating to activities where a comparative advantage exists and the benefits of such research cannot be efficiently captured by private entities
- Promoting a general tax and regulatory environment that is not unnecessarily burdensome to business
- Limiting the use of targeted development preferences to dealing with impediments that cannot be corrected with more general policies

The Evaluation Process. These policies do not provide a magic formula for success. They can, however, create an environment conducive to development. Unfortunately, discerning the effects of such policies is not easy, because successful activities often are not directly linked to the policies that promote them. There may also be considerable delays between when policies are implemented and when their results are seen.

It is important to establish a conceptual framework that can be used to evaluate (either formally or informally) the effectiveness of agricultural value-added programs. Such a framework should incorporate both the positive and negative impacts of increased value-added activities. The net effect of such activities is illustrated in Equation 1.

A successful program should produce positive net benefits. The first two terms in the equation merely incorporate the benefits discussed earlier in delineating the characteristics of a value-added program. The first relates to the expectation of increased demand for local agricultural commodities that serve as inputs in the value-added activities. The second term refers to the value-added activities themselves, such as processing, marketing, and distribution.

These impacts are captured within the state (or whichever jurisdiction is carrying out the program) and do not reflect the total effect on the nation or the world. This raises a potential problem concerning the ability of a state to retain the benefits of its own development program. A program that increases the demand for agricultural inputs does not necessarily guarantee that those inputs will be purchased from in-state producers. For many commodities sold on the world market, much of the impact of value-added activities on the demand for agricultural inputs will be quite diffuse, with only a relatively small fraction of the benefits accruing to in-state producers. Similarly, it cannot be assured that new value-added processes or activities developed in a state will necessarily be employed in the same state. Once the techniques are known, they may be used successfully outside the jurisdiction promoting the research, to the detriment of the state.

If there were no costs in implementing a value-added strategy and all the resources (in both the agricultural and the subsequent value-added stages) were previously unemployed, the increase in value-added from the first two terms of the net-impact equation would constitute

Equation 1

Net impact = Value-added created in agriculture + value-added created in related activities − cost of program − reduction in value-added when resources are withdrawn from other activities

the net benefits. This is often thought to be the case in some less developed economies, where there is assumed to be a surplus of labor, especially in the rural sector.

However, this is unlikely to be true in Illinois, where exist relatively high levels of productivity and low levels of unemployment. In such a case, it is necessary to include the offsetting effect of the reduction in value-added when resources are transferred from an existing activity to a new activity. For example, if efforts to use cornstarch as input in the manufacturing of plastics bags were successful, it would be necessary to offset a portion of the value-added created in this activity by the reduction in the value-added in the traditional production of petroleum-based plastic. Often, this offsetting effect will not be clear-cut (as in this example). That is, the resources will not be drawn from production activities that are direct substitutes for the new activities and instead will come from many sources.

Similarly, increasing the demand for one agricultural input may reduce the demand for other inputs. For example, the increased use of corn-based sweeteners has undoubtedly decreased the demand for sugarbeets or sugarcane. (This may be of little concern for Illinois, however, because these crops are not grown in the state.) New soybean products may reduce the demand for dairy and meat products. These offsetting effects must be considered in determining a net impact of value-added policies.

If new value-added activities arise without subsidization, the workings of the market will ensure a positive net impact on value-added. Resources will flow from lower-valued uses to higher-valued ones. It can also be seen from this analysis that inappropriate subsidies can sometimes lead to a net reduction in value-added if subsidies are misdirected to activities where a state does not have an inherent comparative advantage. In such a case, subsidies encourage the transfer of resources from higher-valued activities to less productive ones. This has happened in many international development programs. Some countries have chosen to encourage activities (often basic heavy industries) in which exists neither any inherent comparative advantage nor any development of comparative advantage through increased experience.

This analysis highlights both the benefits and the risks of agricultural value-added programs. Properly constituted, they have considerable potential to increase the economic well-being of the state. However, if inappropriate activities are subsidized when no natural comparative advantage exists, the net impact will be negative. The value of new activities can be lost to program costs plus reduced productivity in other areas. This suggests that considerable care is necessary in implementing value-added programs and that programs requiring heavy subsidization need careful scrutiny. It also implies that it is extremely important to be able to discern the areas in which a state's comparative advantage actually lies. This is a challenging issue that will be addressed in the remainder of the report.

Toward a Value-Added Strategy for Illinois

Several important questions must be addressed in evaluating the usefulness of a value-added strategy for a state such as Illinois. How can such an approach be applied to the Illinois economy? With the essential role ascribed to comparative advantage, can one characterize the state in terms of regional comparative advantages? Do variations in regional advantages explain industrial development, and do available policies afford state or local decision makers control over their economies?

Comparative Advantages Across Regions in Illinois. Contemporary microeconomic theory explains value creation in terms of fundamental principles of supply and demand for commodities and productive factors. With regard to production, comparative advantages and disadvantages refer to differences in production

costs from such influences as variations in factor prices and qualities, technologies, fiscal policies, product demands, and other attributes. Some of these characteristics (for example, climate and natural resource endowments) cannot be changed, at least not in the short-run, by policy makers, though others are subject to varying degrees of control by various policy tools. An ideal list of attributes from a firm's perspective might include cheap inputs, a well-educated work force, abundant amenities, accelerating product sales, and generous public services and tax breaks. Needless to say, their collective occurrence is as uncommon as mountains and seashore in Illinois. But even one such advantage lowers costs or increases output value so that profits rise, which is how comparative advantage plays an important role in local and state development.

County data are available to study comparative advantages in Illinois. The Glossary includes definitions of the attributes used in this study. The first column lists the variables used for descriptive and statistical analysis; the second column defines each term. The variables are grouped by analytical category. Group I variables relate to labor market characteristics; Group II deals with financial and physical capital; Group III relates to the local fiscal environment; and Group IV contains other variables of potential importance.[3] Considerable effort was expended to acquire disaggregated data for firms by county location and industry type. Data from *County Business Patterns 1984: Illinois* from the U.S. Bureau of the Census proved to be more complete and reliable (and cost effective) than data collected by Dunn and Bradstreet and compiled by the U.S. Small Business Administration.

The variables used in this study were recorded for each of Illinois's 102 counties. However, it would have been unwieldy to describe variation for each attribute across all counties. Consequently, averages were tabulated for regions within the state. These areas, defined as "North," "Central," "South," and "Chicago," are based on the 1988 Cooperative Extension Service regions for Illinois.[4] Although schemes using alternative county aggregates are possible, this one is suitable for depicting gross regional patterns in the Illinois data.

Regional averages are given in Table 1. W84 and EMP84 are averages over two-digit Standard Industrial Classification (SIC) code county industries in each multicounty region.[5] All other values in the table represent averages of county data in each region. For the wage and employment variables in each region, data are reported for the region as a whole and for two sectors that relate to agricultural value-added activities: "resources" and "manufacturing." "Resources" are defined as two-digit SIC codes 07 through 14, whereas "manufacturing" is defined as codes 20 through 33. The former category is a broad representation of agricultural and other raw-material–based activities that provide inputs to intermediate industry. The latter category represents early stages in processing raw materials and includes those manufacturing sectors most likely to receive as inputs agricultural and other raw materials for value-added processing.

The individual two-digit SIC sectors comprising these categories, along with their 1984 Illinois employments, are shown in Table 2. Obviously, all activities in the resources and manufacturing categories are not agricultural value-added, while some agricultural value-added activities fall into other SIC categories not listed. However, this seems to be the best breakdown of activities, given the available data.

From Table 1, one sees that about 51 percent of the state's population lives in areas defined as "urban" (URB) by the census bureau. Chicago is almost entirely urban (96 percent), whereas the South is the least urban (42 percent). Average employment per two-digit sector (EMP84) is also highest in Chicago (4,612), smallest in the South (63), and higher in the Central region (209) than in the North (83). Both urban size and sector size reflect advantages and disadvantages in agglomeration and

scale economies, although these are difficult to specify and measure.

Several indicators measure differences in labor-related attributes. Average annual earnings per worker in resources (W84-AGR) are highest in Chicago ($21,940) and lowest in the South ($17,270); however, the difference from bottom to top is only 27 percent. Similarly, wages in manufacturing (W84-MFG) are highest in Chicago and lowest in the South. Unexpectedly, perhaps, within each region the average wage is higher in resources than in manufacturing by an average of about 8 percent.

Regional wage variations are explained partly by differences in human capital. High-school completion rates (HSKOOL) are lowest in the South (56 percent) and highest in Chicago (75 percent). Similarly, college completion rates (COLL) are also lowest in the South (9 percent) and highest in Chicago (23 percent). Average unemployment (UNEMP) is lowest in Chicago (5 percent) and highest in the South (10 percent). Persons who work outside their county of residence (RES) — an indicator for local labor mobility — appear in about the same ratio to the local work force almost everywhere (20 percent).

There are two indicators for capital resources. The value of farm land and buildings per acre (BLDG) is substantially higher in Chicago ($5,932 per acre) than in all other places; it is lowest in the South ($1,623 per acre). On the other hand, bank deposits per worker (BANK) show the opposite pattern: highest in the South ($15,920 per worker), while lowest in Chicago ($11,810). Regarding three "other" characteristics, crime is highest in Chicago, at almost twice the rate as that which afflicts southern Illinois (4,927 and 2,651 crimes per 100,000 people, respectively). Housing prices (HOUSE) and rents (RENT) follow the same pattern. The average price of a single-family dwelling is more than twice as high in Chicago as in the South ($83,304, compared to $35,690).

Even from these few indicators, a pattern emerges. Wages and prices are highest in Chicago, lowest in southern Illinois, and somewhere in between for central and northern Illinois. Correlated with these are relatively high skill levels and crime rates, and low unemployment rates, in Chicago relative to the South and other regions. Clearly no one region dominates in all the attributes that firms might desire when making a location decision. Thus, it is apparent that there is balancing in spatial advantages across the state. One might hypothesize that for similar groups of workers and firms, the net advantage of relocating from one part of the state to another is often relatively small. For example, the attraction of lower wage rates in one region (in southern Illinois, for example) is at least partially offset by the lower skill levels of workers in that region. The extent of these offsetting impacts is, of course, a testable proposition that careful statistical analysis can address.

There remain the policy variables, which also differ across the state and may affect patterns of local development. Local taxes from all sources relative to local personal income (LOCTAX) are about the same everywhere — except in the South, where they are lowest (3.3 percent, compared to 4.5 percent in the three other regions). However, debt per worker (DEBT), which reflects future tax obligations, is almost twice as high in Chicago as elsewhere ($1,920 per worker, compared to $1,190 elsewhere). Similarly, state transfers per worker (STATE) are about the same everywhere — except in the South, where these transfers are highest ($974 per worker, compared to roughly $650 elsewhere). However, federal transfers (FED) are similar in all places except Chicago, where they are highest ($713 per worker in Chicago, compared to roughly $400 elsewhere).

The primary purpose of taxation is to raise revenue for public programs. Overall, local public expenditures (EXP) are similar across the state, though they are slightly higher in the South than elsewhere ($2,480 per worker in the South, compared to the state average of

$2,290). There is variation within public expenditure categories. Expenditures on public education per worker (ED) are similar across the state but slightly higher in the South than elsewhere. Local expenditures on highways (HW) are $229 per worker, except in Chicago, where the local contribution is roughly half this amount. Similarly, local spending on public welfare programs (WELF) is somewhat less in Chicago than elsewhere ($25 per worker, compared to the state average of $33), as are Chicago expenditures on hospitals ($85 per worker, compared to the average of $151). Local expenditures on police (POL) are almost twice as high in Chicago as in the rest of Illinois ($169 per worker, versus the state average of $100), reflecting, in part, the response to a higher crime rate. In reviewing public services, it is understood that the local contribution taken alone can give a distorted view because state and federal activities may compensate for local programs. For example, if one were to include federal and state expenditures on highways, it could be that those counties in the Chicago region would have higher total highway expenditures per worker than elsewhere.

Interpreting Comparative Advantages. It is clear from the preceding discussion that local economic environments vary considerably around the state. A county-by-county comparison of the characteristics in Table 2 would offer an even more detailed view of relative advantages.[6] At best, however, such a description gives only a partial picture of local economies in Illinois. First, many variables affect value creation and firm profitability. Many of these are extremely difficult to identify, and even when they can be identified, there may be no data to measure them. Second, firms in the same two-digit industry, or even in the same three- or four-digit industry (which are more disaggregated industrial codes), do not necessarily respond with the same sensitivity to a given set of economic characteristics. In addition, conditions within a given county can vary widely around the county average. Consequently, even for available data, results are approximate at best. Third, even though there are sizable spatial variations for any particular attribute, attributes are not independent of one another. In fact, markets tend to compensate for favorable or unfavorable allocations of some attributes through adjustments in wages and land (or housing) prices. For example, from the standpoint of a prospective business, the value of a location with excellent transportation accessibility may be at least partially offset by high land costs as compared to a more remote location.

This has a major implication: if land and labor markets do compensate for variations in other key local economic characteristics, then the importance of intrinsic characteristics that determine comparative advantage will be reduced. This conclusion does not rule out a public role in value-added strategies for economic development. Indeed, it is consistent with the view expressed earlier that a major contribution of public policy is to minimize fiscal and regulatory policies that distort intrastate resource allocation. In order to assess the benefits and costs of existing community economic policies, an essential first step is to explain patterns in industrial development and to understand how firms respond to the public incentives they face.

Modeling Labor Demand Functions. One can use the data described in the preceding section to study determinants of value-added activity in Illinois. However, these data constrain both the structure of the econometric model and the variables that can be investigated. U.S. Department of Commerce computer tapes recording data from the *County and City Data Book 1983* and *County Business Patterns 1984* for Illinois are used. From these data, county employment by industry offers the best angle for studying local economies. Value-added data *per se* are unavailable to study even the two-digit industries described in Table 2. The basic observations used in regression are three-digit SIC code employments for sectors 07 through 33 in Illinois counties. Models are estimated

for resources (sectors 07 through 14) and manufacturing (sectors 20 through 33).

Estimating equations are derived from a framework similar to those used in earlier work.[7] The model describes a competitive regional labor market. Within each region, the aggregate demand for labor is derived from the demands of individual firms. These are driven in part by conditions in commodity markets, so that the focus on regional labor is, in effect, a focus on regional value-added. Most variables listed in the Glossary can be taken as exogenous to local labor markets. However, if both labor demand and labor supply are sensitive to local wages, then the wage must be treated as endogenously determined within each region. Consequently, the estimating equations (abbreviations defined in the Glossary) take the forms shown in Equations 2 and 3, where g and f are functions that have the expected signs summarized in Table 3, and *RES*W84* is the multiplicative interaction between RES and W84. Formally, this is a two-stage least squares econometric model of a regional labor market. The W84 equation regresses the dependent wage on all exogenous terms appearing in the model, and the EMP84 equation regresses employment on the fitted wage from W84 with all other exogenous demand shifters. All variables are in "raw" form; that is, none has been transformed mathematically. The model assumes implicitly that labor markets are in equilibrium across regions in the state. This is not an unreasonable assumption, although it would also be interesting to consider dynamic adjustment processes. This cannot be done, however, because data are not available from two or more points in time.

In the first stage of regression analysis, exogenous variables may shift either the labor supply curve (S), the labor demand curve (D), or both, thereby affecting the equilibrium wage and level of employment. BANK, as a proxy for available capital, increases the marginal product of labor, shifts out D, and raises the wage. P, which represents the manufacturing value-added per worker and is a proxy for commodity price, increases the value of the marginal product of labor, shifts out D, and also increases the wage. FED and STATE refer to public-induced increases in labor demand, and shift out D.[8] HSKOOL and COLL have dual effects. They increase labor productivity and thereby shift out D. They also increase the opportunity cost of labor and shift S leftward. Both effects drive up the equilibrium wage. CRIME shifts the labor supply function leftward, driving up the wage. Similarly, higher rents (or housing prices) push S leftward if conditions require that higher wages compensate for higher local living costs. On the other hand, publicly provided consumer services (ED, HW, WELF, HOSP, and POL) lower the reservation wage of labor supply, everything else the same.[9] A higher unemployment rate

Equation 2

$$W84 = g(BANK, P, TAX, DEBT, FED, STATE, EXP, EXP2, HSKOOL, COLL, URB, UNEMP, CRIME, ED, HW, WELF, HOSP, POL, RENT)$$

Equation 3

$$EMP84 = f(W84, RES*W84, BANK, P, TAX, DEBT, FED, STATE, EXP, EXP2, HSKOOL, COLL, URB)$$

(UNEMP) may also lower reservation wages. Taxes (TAX) and future tax obligations (DEBT) have an ambiguous effect on the wage: they may lead to higher reservation wages as compensation for a higher cost of living. However, they may also cause labor demand curves to shift inward due to a lowering of the net-of-tax output price, P. Public expenditures (EXP) have the opposite effect of taxes and represent other public spending not already specified. Urban status is a control variable without *a priori* sign.

These first-stage results are interpreted as changes in the equilibrium wage, whereas most second-stage results are viewed as shifts in the labor demand function. In the second stage, expected signs for BANK, P, FED, and STATE are as before, and are due to outward shifts in *D*. The tax-related terms, TAX and DEBT, are expected to create lower employment levels at given wage levels. The interpretation for EXP is the opposite of TAX, assuming that public programs create net benefits. A negative (positive) coefficient for EXP2 indicates decreasing (increasing) marginal benefits from these services. HSKOOL and COLL simultaneously affect supply and demand, but in opposite directions. Holding constant the effects on supply, higher completion rates for high school and college are expected to shift out the demand function for labor.

Results from Estimation. The results from estimation are given in Tables 4a through 4c. Although the findings are hardly definitive — few statistical results in location analysis are — they suggest underlying structure. Each equation has a highly significant *F* statistic, which means that it is highly unlikely that correlation attributed to the estimating equation is due entirely to chance. In addition, each equation explains roughly 25 percent of the variation in its dependent variable.

The results for manufacturing are most relevant to a value-added strategy for economic development because this is the group of industries that process agricultural and other raw materials. Table 4a reports findings for the reduced-form manufacturing wage equation. Of the twelve "significant" coefficients (using a significance level of roughly 10 percent), only HSKOOL has an unexpected sign. (See Table 3 for expected signs.) Several other terms have unexpected signs as well, but with trivial *t* statistics. Four of these are in the expenditure group: ED, HW, WELF, and HOSP. TAX and DEBT are significant, but with opposite signs. TAX, which has the positive coefficient, indicates that higher local taxes are reflected more in compensatory higher wages than in reduced labor demand, whereas expected future taxes have a stronger effect on labor demand. Federal and state spending, especially the former, drive up local wages. There is also evidence for the local price-wage multiplier observed in earlier work, given the result for RENT.[10] Finally, BANK has the expected effect on labor's marginal productivity, and higher CRIME leads to higher compensatory wages.

Table 4b reports results for structural labor demand in manufacturing. Although there are only three unexpected signs, no coefficient in the model is statistically significant. This outcome may in itself be important, but how can it be explained? For comparison, the second-stage results for resources are given in Table 4c, with outcomes similar to manufacturing. Why is it that the structural labor demand functions, given in the second-stage regressions, do not yield stronger evidence for "expected" economic structure? Several considerations are pertinent.

Most important, the findings are not inconsistent with received theory, and inelastic responses to exogenous terms are possible. In other words, it is quite possible that labor demand responds less than proportionately to changes in the independent variables. Only marginal decisions are assumed to be affected by the explanatory variables. If most firms are not "on the margin" — comfortably ensconced in current locations — then spatial variations in characteristics such as wages will not cause

firms to alter employment decisions. The findings do not rule out the expected effects; however, standard errors are so large relative to their coefficients that null hypotheses of no effects cannot be ruled out, either. In addition, the effects of some inherent advantages may be capitalized in various prices, thereby reducing their impact and thus their significance in the regression results.

Additional reasons that may explain the second-stage findings are addressed in the following section.

Strategies for Further Research. The analysis and evaluation of local economic policies hinge on the precision of our statistical estimates. It is important to determine, therefore, whether additional analysis will confirm the findings in Tables 4a through 4c. How can further effort improve on these results? It is suggested that the following considerations be addressed:

- How sensitive are the estimates to functional form? Results from the linear models should be compared to those from logarithmic models. In addition, results from two-stage least squares should be compared to ordinary least squares.
- The benchmark models may include substantial multicollinearity in their explanatory variables. Some of these relationships can be found using Pearson correlation coefficients between explanatory terms. For example, HSKOOL and COLL are positively (and significantly) correlated by definition. Similarly, EXP is positively (and in most cases, significantly) correlated with ED, HOSP, POL, HW, and WELF because of local government budget identities. Also, TAX and DEBT are positively and significantly correlated, as are STATE and FED. These and other correlations are not accidents, and although they do not bias the estimations, they increase the standard errors of the individual coefficients. It may be desirable to choose among collinear terms, rather than to include all in the same model.
- Expanding the data set to include observations from at least two points in time could improve estimation for two reasons. First, it would allow one to take differences in the data (that is, to calculate the change in variables over time), which usually improves a model's precision. Second, it would allow one to consider questions of dynamic adjustment.

Further work that addresses these issues may lead to more precise measures for the parameters characterizing local labor markets in Illinois. These estimates could then be used to evaluate value-added strategies for local economic change.

These refined estimates could also be used to evaluate the economic performance and potential on a county-by-county basis. Actual performance for each county in the state could be compared to the expected performance predicted by the model. Differences between the actual and predicted levels of performance might be explained by one of three factors: (1) the influence of variables not included in the analysis, (2) the presence of unexploited resources (if expected exceeds actual) or intensively used resources (if actual exceeds expected), or (3) random variation.

The results of this procedure might be used in several ways to promote development. For example, it would be interesting to examine in detail counties that are performing better than explanatory variables predict. It then might be possible to determine factors that led to success in these counties that might be transferable to other areas. The analysis could also be used to identify counties that have considerable development potential. Counties that are currently performing below expectations may, with a few suitable changes, be fertile areas for new and expanded activities. These procedures can be carried out using the results derived here, but it would be preferable to conduct this analysis using a more refined model with more complete data.

Summary and Conclusions

In this report, the value-added strategy for promoting agriculture-related enterprise was defined as the promotion of any activity that increases the value (by whatever means) of any raw material indigenous to the local area. The expected implications of such activities for the local economy were then discussed. The potential strengths and weaknesses of such an approach were evaluated. The approach seemed most appropriate when used to encourage the development of activities in regions with genuine comparative advantages rather than to attempt to change basic regional attributes.

The problem of implementing such an approach lies in the ability of officials to identify and promote potentially productive activities that would not otherwise be generated spontaneously by private actions. Policies that might be useful in this regard include (1) human capital development through education and training, and physical infrastructure investment; (2) promotion of basic and applied research in areas where comparative advantage has been identified; (3) maintenance of a stable state and local fiscal environment; and (4) elimination or reduction of existing impediments for particular activities.

A framework for evaluating the overall impact of value-added activities was developed to weigh the impact of increased value-added in agriculture and related activities against program costs and reduced economic activity in other sectors of the economy. This illustrated that a well-designed program has the potential to expand state output, while a poorly designed program can have a negative net effect.

The empirical section of the report used data from Illinois counties to set up a model that analyzed comparative advantage. The results were encouraging, but not definitive. Suggestions were then presented for further research that would refine the model and improve the data set used. It was suggested that the results of the improved model could be used to identify currently successful value-added activities so that the reasons for their success could be studied. The results could also be used to target areas that seem to have high development potential.

Notes

1. For a discussion of the value-added strategy, see Deaton and Johnson.
2. *Management and Program Audit of the Department of Commerce and Community Affairs' Economic Development Programs,* Office of the Auditor General, state of Illinois, July 1989.
3. Data for these variables are derived from tapes for the *County and City Data Book 1983* and *County Business Patterns 1984: Illinois,* U.S. Bureau of the Census.
4. "North" is Cooperative Extension regions 1 and 2, "Chicago" is 3, "Central" is 4 and 5, and "South" is 6 and 7. "Chicago" is the area defined by Cook, DuPage, and Lake counties. The other regions roughly split the state into thirds from north to south.
5. In calculating W84 and EMP84, the same industry may have been represented in more than one county and, consequently, could be included more than once in finding the regional average. At the same time, some two-digit sectors may not have been present in some counties.
6. As noted previously, the data collected for this study provide this information for each county in Illinois. They are reported here in aggregated, regional form to conserve space.
7. For more on the underlying economic structure giving rise to the models tested in this paper, see Bartik (1985), Carlton (1979 and 1983), and Crihfield (1989 and in press).
8. This assumes that public-sector demands for labor are not initiated in private-sector commodity markets, which in this model are reflected in P. The assumption seems reasonable, considering that the public sector is the dominant provider for many services it produces.
9. This assumes that these specific services are primarily consumer-based rather than producer-based. Producer-based services shift out the demand for labor. To the extent that both effects are present, the analysis of first-stage results for the equilibrium wage is one way to determine which curve is affected the most.
10. See Tolley (1974) and Izraeli (1977).

Glossary: Economic Attributes of Illinois Counties and Industries

Group I Variables. Labor Market

W84	Total annual payroll divided by total mid-March employment (1984)
HSKOOL	Fraction of persons 25 years old or older with at least 12 years of education (1980)
COLL	Fraction of persons 25 years old or older with 4 years of college (1980)
UNEMP	Unemployed persons divided by the civilian labor force (1980)
RES	Persons employed outside county of residence divided by employed persons (1980)

Group II Variables. Capital

BANK	Total bank deposits (June 1981, in thousands) divided by employed persons (1980)
BLDG	Average value of land and buildings per acre (1978)

Group III Variables. State and Local Fiscal

LOCTAX	Taxes of local governments (1977, in thousands) divided by personal income by place of residence (1981, in thousands)
TAX	Local taxes (1977, in thousands) divided by employed persons (1980)
DEBT	General debt of local governments outstanding (1977, in thousands) divided by employed persons (1980)
EXP	Direct general expenditures of local governments (1977, in thousands) divided by employed persons (1980)
EXP2	The square of EXP
STATE	Intergovernmental revenue of local governments from state government (1977, in thousands) divided by employed persons (1980)
FED	Earnings of federal civilian government employees (1981, in thousands) plus intergovernmental revenue of local governments (1977, in thousands) less intergovernmental revenue of local governments from state government (1977, in thousands) divided by employed persons (1980)
ED	Direct general expenditures of local governments for education (1977, in thousands) divided by employed persons (1980)
HW	Direct general expenditures of local governments for highways (1977, in thousands) divided by employed persons (1980)
WELF	Direct general expenditures of local governments for public welfare (1977, in thousands) divided by employed persons (1980)
HOSP	Direct general expenditures of local governments for health and hospitals (1977, in thousands) divided by employed persons (1980)
POL	Direct general expenditures of local governments for police protection (1977, in thousands) divided by employed persons (1980)

Group IV Variables. Other

CRIME	Crimes per 100,000 people (1980)
RENT	Median annual gross rent (1980)
HOUSE	Median value of owner-occupied housing unit (1980)
URB	Urban population divided by total population (1980)
P	Value-added in manufacturing (1977) divided by employed persons (1980)
EMP84	Total mid-March employment (1984)

SOURCE: *County and City Data Book 1983* and *County Business Patterns 1984: Illinois* data tapes.

References

Bartik, Timothy J. 1985. Business location decisions in the United States: Estimates of the effects of unionization, taxes and other characteristics of states. *Journal of Business and Economic Statistics* 3:14–22.

Carlton, Dennis W. 1979. Why new firms locate where they do: An econometric model. In *Interregional Movements and Regional Growth,* pp. 13–50. Edited by William C. Wheaton. Washington, D.C.: The Urban Institute.

———. 1983. The location and employment choices of new firms: An econometric model with discrete and continuous endogenous variables. *The Review of Economics and Statistics* 65:440–49.

Crihfield, John B. 1989. A structural empirical analysis of metropolitan labor demand. *Journal of Regional Science* 29:347–71.

———. Manufacturing supply: A long-run, metropolitan view. *Regional Science and Urban Economics* (in press).

———. Deaton, Brady J., and Thomas G. Johnson. Attracting value-added business. Mimeograph, Virginia Polytechnic Institute and State University (undated).

Illinois. Office of the Auditor General. 1989. *Management and Program Audit of the Department of Commerce and Community Affairs' Economic Development Programs.* Springfield: Illinois Legislative Printing Unit.

Izraeli, Odel. 1977. Differentials in nominal wages and prices between cities. *Urban Studies* 14:275–90.

Tolley, George S. 1974. Welfare economics of city bigness. *Journal of Urban Economics* 1:324–45.

U.S. Department of Commerce. Bureau of the Census. *County and City Data Book 1983.* Washington, D.C.: U.S. Government Printing Office.

———. 1985. *County Business Patterns 1984: Illinois.* Washington, D.C.: U.S. Government Printing Office.

Table 1. Comparative Advantages Across Regions in Illinois

Variable	State of Illinois	Region			
		Central	Chicago	North	South
Labor market					
W84	$17.15	$16.23	$19.17	$17.80	$15.94
W84-AGR	$18.26	$17.74	$21.94	$19.43	$17.27
W84-MFG	$16.92	$15.92	$18.91	$17.60	$15.32
HSKOOL	63.7%	66.4%	74.6%	67.7%	56.1%
COLL	11.8%	12.7%	23.5%	12.0%	8.9%
UNEMP	8.0%	7.6%	5.5%	6.7%	9.8%
RES	22.0%	19.3%	24.7%	24.4%	21.9%
Capital					
BANK	$13.78	$13.48	$11.81	$11.91	$15.92
BLDG	$2,638	$2,851	$5,932	$2,978	$1,623
State and local fiscal					
LOCTAX	4.1%	4.4%	4.4%	4.6%	3.3%
DEBT	$1.230	$1.190	$1.920	$1.180	$1.190
EXP	$2.290	$2.210	$2.430	$2.130	$2.480
STATE	$0.759	$0.663	$0.663	$0.624	$0.974
FED	$0.431	$0.421	$0.713	$0.393	$0.424
ED	$1.170	$1.080	$1.190	$1.180	$2.240
HW	$0.229	$0.259	$0.127	$0.220	$0.226
WELF	$0.033	$0.032	$0.025	$0.042	$0.027
HOSP	$0.151	$0.092	$0.085	$0.104	$0.252
POL	$0.100	$0.095	$0.169	$0.099	$0.093
Other					
CRIME	3,290	3,293	4,927	3,733	2,651
RENT	$3,032	$3,001	$3,963	$3,358	$2,637
HOUSE	$46,223	$43,861	$83,304	$54,115	$35,690
URB	51.0%	50.9%	95.9%	53.5%	41.5%
EMP84	372.6	82.7	4,611.9	208.7	63.5
EMP84-AGR	40.4	9.4	284.7	24.0	33.1
EMP84-MFG	496.7	108.9	6,559.1	260.4	77.6

NOTE: See Glossary for explanation of variables. All dollar figures are expressed in 1982 dollars; all except BLDG, RENT, and HOUSE are in thousands. W84 and EMP84 are averages for two-digit Standard Industrial Classification sectors in the table. In the regressions, however, observations are defined at the three-digit level.

Table 2. Total Employment in the Resources and Manufacturing Sectors in Illinois During 1984

Standard Industrial Classification code	Employment sector	1984 Illinois employment
		number of workers
Resources		
07	Agricultural services	11,692
08	Forestry	54
09	Fishing, hunting, and trapping	60
10	Metal mining	51
12	Bituminous coal and lignite mining	15,760
13	Oil and gas extraction	6,733
14	Nonmetallic minerals, except fuels	3,286
Manufacturing		
20	Food and kindred products	82,867
21	Tobacco manufactures	375
22	Textile mill products	3,750
23	Apparel and other textile products	16,197
24	Lumber and wood products	10,641
25	Furniture and fixtures	19,569
26	Paper and allied products	32,959
27	Printing and publishing	104,026
28	Chemicals and allied products	49,940
29	Petroleum and coal products	8,020
30	Rubber and miscellaneous plastics products	47,875
31	Leather and leather products	5,058
32	Stone, clay, and glass products	26,555
33	Primary metal industries	57,199

SOURCE: U.S. Department of Commerce, Bureau of the Census, *County Business Patterns 1984: Illinois.*

Table 3. Expected Signs in Econometric Equations

Variable	First-stage regression	Second-stage regression
Labor market		
W84	dependent variable	−
HSKOOL	+	+
COLL	+	+
UNEMP	−	not applicable
RES	not applicable	−
Capital		
BANK	+	+
BLDG	+	+
State and local fiscal		
TAX	ambiguous	−
DEBT	ambiguous	−
EXP	ambiguous	+
EXP2	ambiguous	ambiguous
STATE	+	+
FED	+	+
ED	−	not applicable
HW	−	not applicable
WELF	−	not applicable
HOSP	−	not applicable
POL	−	not applicable
Other		
CRIME	+	not applicable
RENT	+	not applicable
URB	ambiguous	ambiguous
P	+	+
EMP84	not applicable	dependent variable

NOTE: See Glossary for explanation of variables. The first stage represents the reduced-form wage equation, and the second stage represents the labor demand function. The symbol + (−) means that the dependent variable rises (falls) with an increase in the independent variable.

Table 4a. Manufacturing: First-Stage Regression

Variable	Coefficient	*t* value
Intercept	71.28962	2.13
BANK	0.50612	1.68
P	34.60464	1.38
HSKOOL	−90.33068	−2.18
COLL	92.07090	1.98
TAX	14.92491	2.68
STATE	2.81391	0.33
URB	5.36337	0.47
EXP	−70.75982	−3.15
EXP2	13.86760	3.14
FED	25.71734	2.02
DEBT	−4.72719	−1.68
RES	13.78527	1.28
UNEMP	104.16448	1.36
CRIME	0.00196	2.61
ED	6.73150	0.95
HW	18.40154	0.89
WELF	15.87227	0.52
HOSP	3.62220	0.53
POL	−70.31030	−2.22
RENT	0.00812	1.53

NOTE: See Glossary for explanation of variables, and Table 3 for expected signs. *F* value = 3.215; R^2 = 0.277; adjusted R^2 = 0.191.

Table 4b. Manufacturing: Second-Stage Regression

Variable	Coefficient	*t* value
Intercept	4174.28188	0.29
W84	−45.84850	−0.34
BANK	145.94317	1.45
P	4014.36664	0.50
TAX	2560.94825	1.11
HSKOOL	−7469.10825	−0.47
COLL	11426.16005	0.67
STATE	1030.64239	0.40
URB	1828.30523	0.45
EXP	−5247.64710	−0.68
EXP2	953.83612	0.61
FED	−1194.13607	−0.25
DEBT	321.09476	0.28

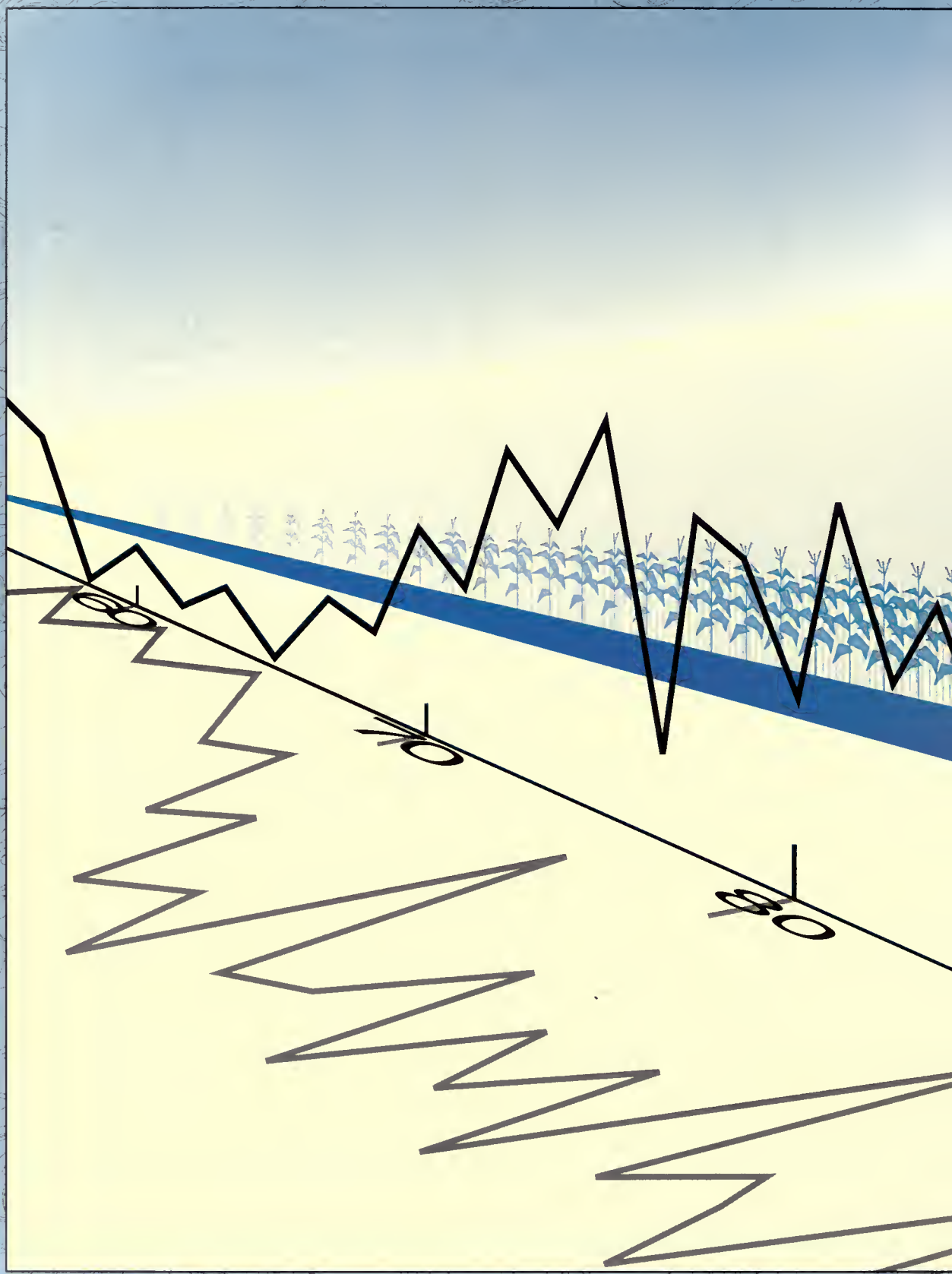
NOTE: See Glossary for explanation of variables, and Table 3 for expected signs. *F* value = 4.808; R^2 = 0.247; adjusted R^2 = 0.196.

Table 4c. Resources: Second-Stage Regression

Variable	Coefficient	*t* value
Intercept	−745.46254	−0.58
W84	16.42850	1.16
BANK	39.72130	2.49
P	1122.00818	0.92
TAX	518.03043	1.67
STATE	682.74451	1.41
BLDG	0.05215	0.98
EXP	−459.53344	−1.07
EXP2	54.75662	0.93
FED	−454.03083	−0.76
DEBT	−30.19640	−0.22
HSKOOL	−1235.63659	−0.65
COLL	1696.06944	0.74
URB	413.28186	0.87

NOTE: See Glossary for explanation of variables, and Table 3 for expected signs. Results from the first-stage regression are not reported. *F* value = 3.220; R^2 = 0.385; adjusted R^2 = 0.265.

1M—8-90—76078—NN


80
90
00